

BOOK REVIEWS

THE LEGUMINOSAE: A SOURCE BOOK OF CHARACTERISTICS, USES AND NODULATION, by O. N. Allen and Ethel K. Allen, with pp. 812. Macmillan Press, 1981. £35,00.

This substantial volume presents a comprehensive assemblage of data concerning the Leguminosae and could almost be described as an encyclopedia of this large and economically important family of flowering plants. Its authors' aims in producing this work are to meet the need for a comprehensive presentation of generic diagnoses of the family, to provide a review of the uses and value of legumes and to furnish a survey of nodulation scope within the family.

The introductory chapter is a valuable overview of the chief features of the family and the remarkable legume-rhizobium symbiosis which is manifested by so many of its members. Topics discussed include the taxonomy of the family as a whole; the symbiotic process and the evolution of the plant; bacterium association; cross inoculation grouping; root nodule initiation and development; false nodulation and the inability of some genera, notably of the sub-family Caesalpinioideae, to accomplish a symbiotic relationship with *Rhizobium*. The biochemistry of the nitrogen fixing process which is such an important aspect of the symbiosis is not discussed even in elementary form, but references to suitable specialist texts on this topic are given.

In the main part of the work, the 750 known genera of the family have been arranged in alphabetical order and a full botanical description of each genus provided, together with discussion on its taxonomic position, where controversy exists. As the authors point out, the book was in preparation at the time of the International Legume Conference at Kew in August, 1978, so that new taxonomic decisions promulgated at this meeting have not been incorporated in the diagnosis. These changes, such as they are, have only a marginal effect on the value of the taxonomic treatment as a whole.

Each entry also includes the etymology of the generic name, an interesting study in itself, and information on the endemic geographical areas and basic ecological habitats of the members of each genus. Then follows a wealth of information concerning the special features and characteristics of the more important species. This includes discussions of the medicinal uses of the plants, their toxic principals where present, their nutritional value and agricultural usage, their commercial value and their chemical composition where this includes unusual or important compounds. Entertaining historical details concerning the use of these plants by man are often given. We hear, for instance, how *Indigofera* and the dye it produces was responsible for the formation in 1631 of the Dutch East India Company and the political furore it caused in Europe owing to its devastating effect on the entrenched woad industry; and again of the effect of the introduction to Europe of logwood (*Haematoxylon*) on the advancement of cytology; and the use of the seeds of *Abrus precatorius* as standard weights in East Asia (they each weigh a remarkably consistent 0,113 g and were used to obtain the mass of the Koh-i-noor diamond).

Each entry concludes with a survey of the nodulation data available for the genus. This includes the number of species known to be nodulated (with reference to), the type of nodules present and the characteristics of the rhizobia associated with the plants. In this respect it is interesting to note how heavily the authors have drawn on

the valuable information assembled by Professor N. Grobbelaar and his colleagues at Pretoria University. Included in the book is a very comprehensive reference section (1,500 titles), a common name index, and a valuable appendix summarizing the nodulation data.

Illustrations of the leaves, flowers and pods of some 40 species are provided and, more importantly, of the eight types of root nodule featured in the text.

The book has been well produced and entertainingly written, furnishing a wealth of information for taxonomists, physiologists, ecologists, nutritionists, agriculturists, medical physicians, and, indeed, members of the "lay public" interested in this protean and ubiquitous family. It should be of particular interest to South Africans whose homeland is shared so prominently and colourfully by the legumes.

O. A. M. LEWIS

INDEX KEWENSIS SUPPLEMENT XVI, with pp. 1–309. ISBN 0–19–854531–2. London & New York: Oxford University Press, Oct. 1981. £60.

For any alpha taxonomist interested in flowering plants, the publication of another supplement of the *Index Kewensis* must give rise to a feeling of comfortable reassurance, for its very appearance—particularly its bulk—is a symbol that his particular discipline is alive and well.

Seven years have elapsed since the publication of the 15th supplement and the issue of the 16th supplement in 1981 covering the years 1971–1975. One is immediately struck by the fact that the new supplement contains 309 pages, twice as many as the previous three which averaged 148 pages. The principal reason for such a dramatic expansion is that for the first time names of all taxonomic ranks from family downwards are included. In fact the 16th supplement includes all names subject to the principle of priority and the *Rules of the International Code of Botanical Nomenclature*.

Under the circumstances it is remarkable that the Kew staff, responsible for the compilation of this prodigious work, have succeeded in getting it published so soon. Inevitably the cost has risen steeply, from £9.50 for the 15th supplement in 1974 to £60 for the latest supplement. Despite the price, I doubt whether there will be a botanical library anywhere which will not place the purchase of this volume at the top of its priority list.

J. P. ROURKE

PLANT CELL REPORTS, VOLUME 1 No. 1 (An international bimonthly), editors K. Hahlbrock (Europe) and O. L. Gamborg (Countries outside Europe). Springer-Verlag, Heidelberger Platz 3, D-1000 Berlin 33, West-Germany. Vol. 1 No. 1, pp. 1–42. Annual subscription DM 158.

The purpose of this new journal is to obtain rapid communication among all scientists with an interest in plant cell research. In order to ensure rapid publication it is envisaged that camera-ready typescripts be published bimonthly, usually within two to ten weeks from the date a manuscript has been accepted for publication. To

achieve this goal and to ensure a high scientific standard use is made of both an Editorial and an Advisory Board which consist of internationally recognized scientists.

As with all Springer-Verlag publications the general appearance of this journal is pleasing and effective use is made of available space by using two columns on each page.

Volume 1 No. 1 of this publication contains 13 papers of varying length. These first papers are well illustrated and embodied a large number of different disciplines. Noticeable however, is that the bulk of the papers is devoted to the field of tissue culture and/or biotechnology which is expected to play an important role in the "second green revolution".

Any organisation seriously interested in physiology, biochemistry, molecular biology, genetics, and plant breeding as well as the medical/pharmaceutical sciences should have this new journal on their bookshelves. Hopefully the journal will be well supported and will live up to expectations.

J. VAN STADEN

METABOLISM AND MOLECULAR ACTIVITIES OF CYTOKININS, edited by J. Guern and C. Péaud-Lenoël, with pp. 352. 1981. ISBN 3-540-10711-8. Obtainable from: Springer-Verlag, Heidelberger Platz 3, D-1000 Berlin 33. US \$44.60.

This book represents the Proceedings of the International Colloquium of the Centre National de la Recherche Scientifique held at Gif-sur-Yvette (France) 2 to 6 September 1980. The contents cover a large number of topics which had been discussed at Biological conferences in recent years. It covers: Cytokinin biosynthesis.—Cytokinin metabolism and physiological responses in plant or bacterial systems.—Cytokinin hormone receptors.—Cytokinin in protein synthesis and RNA metabolism.—Cytokinins and chloroplast development.—Animal systems responding to cytokinin or cytokinin analogs.

While it is essential that this neatly produced book should be on the shelves of all organisations interested in plant physiological teaching and/or research it is nevertheless surprising that more attention was not given to the metabolism of both synthetic and endogenous cytokinins. Particularly, as this aspect features very prominently in the title of the book. Despite this shortcoming the number of important aspects developed makes it a valuable source of information for both undergraduate and post-graduate training. Researchers in the field of plant growth substances and those interested in cell differentiation at the molecular level will find this book invaluable.

Considering its neat outlay, the large number of illustrations, and the quality and relevancy of its contents I feel that this book is reasonably priced and should find wide appeal amongst plant physiologists.

J. VAN STADEN

BIOLOGY OF INORGANIC NITROGEN AND SULPHUR, edited by H. Bothe and A. Trebst, with pp. viii and 384 and 144 figures. ISBN 3-540-10486-0. Berlin, Heidelberg, New York: Springer-Verlag, 1981. Cloth, approx US \$46.80

There are many similarities between the biological cycles of nitrogen and sulphur. Both elements occur in nature in a highly oxidized form and are converted to a very reduced form by organisms in order to enable them to fulfil most of their essential metabolic functions. It therefore is quite appropriate that the biology of the inorganic forms of these two elements are considered together in one book. The contents of the book represents the proceedings of an international conference which was held in Bochum, Federal Republic of Germany, during 1980. As a consequence the different chapters do not interlock as well as can be expected from a textbook.

The chapters are grouped under the following headings: General introduction (one chapter), Nitrogen metabolism in general (three chapters), Dinitrogen fixation (six chapters), Sulphur metabolism in general (six chapters), Contributed papers: Nitrogen Metabolism (eleven chapters), and contributed papers: Sulphur (five chapters).

The general introductory chapter by Schlegel sets the scene in an admirable way and concentrates on the micro-organisms that are involved.

In the section on nitrogen metabolism in general, the chapter by Beevers is disappointing partly because of its superficial nature and partly because it is rather out of date. So for instance, with reference to the *Alnus* type of symbiotic nitrogen fixation systems, he states that "It appears that the symbiont is an actinomycete, however the organism has not been isolated and cultivated in the free-living state". Despite the title of the book, the chapter also contains several pages on amino acid and ureide intermediary metabolism which nevertheless is quite cursory. The other two chapters in this section in contrast, provide a rigorous treatment of assimilatory and dissimilatory nitrate reduction. The former topic, which has received considerable attention in recent years is dealt with comprehensively and contains an extended bibliography.

In the section on dinitrogen fixation, two chapters are devoted to genetic aspects. The one by Brill deals almost exclusively with recent work from his laboratory on *Klebsiella pneumoniae* whilst the one by Heumann concentrates on *Rhizobium* genetics. The latter chapter is written in a very lucid and stimulating style and draws many interesting comparisons between the biology of *Rhizobium* and *Agrobacterium* species. In the chapter by Postgate *et al.* on "Some aspects of the physiology of dinitrogen fixation", the authors restricted themselves to a scholarly presentation of recent ideas concerning three topics, viz. Oxygen as a regulator of nitrogenase, Hydrogenase and the efficiency of *Azotobacter*, and Molybdenum in the regulation of nitrogenase synthesis. The chapter by Zumft on the biochemistry of dinitrogen fixation deals with work published after 1976 and is most informative. In dealing with the regulatory aspects of dinitrogen and ammonium assimilation in nitrogen fixing bacteria, Kleiner *et al.* used a highly condensed style of writing which does not make for easy reading. The very topical subject of the relationship between hydrogenase and nitrogenase in nitrogen fixing organisms is presented expertly by Eisbrenner with special emphasis on what is known for the Cyanophyceae.

The section on general sulphur metabolism contains chapters on assimilatory sulphate reduction, the ecology and physiology of some anaerobic bacteria from the microbial sulphur cycle, the energetic aspects of dissimilatory sulphate reduction, photolithotrophic sulphur oxidation, and the oxidation of ammonia by *Nitrosomonas* and of inorganic sulphur by *Thiobacillus* spp..

Although the subject matter of some of the chapters in the two sections entitled "Contributed Papers" overlap considerably with those mentioned above, most of them are largely complementary. In this regard, special mention should be made of the chapter by Vennesland on the control of nitrate reduction by HCN; by Hess on *in vitro* associations between non-legumes and *Rhizobium*; by Hennecke on a comparison of the regulation of nitrogenase biosynthesis in free-living and symbiotic nitrogen-fixing bacteria; and by Knobloch *et al.* on the thiosulphate-cytochrome c-oxidoreductase enzyme system.

The book contains very few printing errors and the text, generally speaking, is very concise yet lucid. The lists of references varies. In most cases it does not include the titles of the papers as is customary in chemical and biochemical bibliographies. The book contains a wealth of information about some rapidly developing and very important biological topics and it is highly recommended to researchers and post-graduate students who are interested in the relevant topics.

NATHANAËL GROBBELAAR

PHYSIOLOGICAL PROCESSES IN PLANT ECOLOGY, by C. B. Osmond, O. Björkman and D. J. Anderson, with pp. xi and 468, 194 figures and 76 tables. ISBN 3-540-10060-1 Berlin, Heidelberg, New York: Springer-Verlag, 1980. Cloth, approx. US \$57-90.

This book represents vol. 36 of the series on *Ecological Studies* with W. D. Billings, F. Golley, O. L. Lange and J. S. Olson as general editors.

The title of the book is rather misleading. In actual fact, it is a synthesis of virtually all the existing knowledge concerning members of the genus *Atriplex*. Apart from chapters on the systematics and geographical distribution of *Atriplex*, genecological differentiation in general, the genetic and evolutionary relationships in *Atriplex* and the effects of regional environments on *Atriplex* communities, the remainder of the book is devoted to such more truly physiological aspects as seed germination and seedling establishment, the absorption of ions and nutrients, water movement and plant response to water stress, photosynthesis and the influence of environmental factors on productivity—always with the accent on *Atriplex*.

Despite the fact that the book is primarily concerned with *Atriplex*, it should be of considerable interest to many ecologists and plant physiologists because the genus *Atriplex* is a large one encompassing more than 400 species occurring on all continents and many islands between at least N 70° and S 46°. The wide range of the physiological attributes of members of the genus is probably one of the chief reasons why the genus has been studied so extensively in many respects. In this regard the chapters on the mineral nutrition and photosynthesis of members of the genus are especially valuable.

Despite the fact that the book covers a wide range, it presents the reader with a remarkably coherent account which reads easily and contains very few printing errors. Indeed, the presentation and quality of the figures are very good, as is the quality of the paper. A single extensive list of references containing the titles of the relevant papers is provided at the end of the book.

The book will be welcomed by plant physiologists and ecologists in general but also by geneticists interested in *Atriplex*. Although the book will primarily be used by researchers and post-graduate students, its rather high price will probably limit its distribution.

NATHANAËL GROBBELAAR